U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-262 871

# Brush Lake, McLean County, North Dakota

National Eutrophication Survey, Las Vegas, Nev

Prepared for

Environmental Monitoring and Support Lab, Las Vegas, Nev

Oct 76

PB 262 871

# U.S. ENVIRONMENTAL PROTECTION AGENCY
# NATIONAL EUTROPHICATION SURVEY

## WORKING PAPER SERIES

**CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON**

**and**

**ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA**

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

☆G.P.O. 699-440

| TECHNICAL REPORT DATA<br>*(Please read Instructions on the reverse before completing)* | | |
|---|---|---|
| 1. REPORT NO. | 2. | 3. RECIPIENT'S ACCESSION NO. |
| 4. TITLE AND SUBTITLE<br>Report on Brush Lake, McLean County, North Dakota | | 5. REPORT DATE<br>Prepared October 1976<br>6. PERFORMING ORGANIZATION CODE |
| 7. AUTHOR(S)<br>Anonymous (National Eutrophication Survey Staff) | | 8. PERFORMING ORGANIZATION REPORT NO.<br>Working Paper # 467 |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>National Eutrophication Survey<br>U.S. Environmental Protection Agency<br>200 S. W. 35th St.<br>Corvallis, Oregon 97330 | | 10. PROGRAM ELEMENT NO.<br>11. CONTRACT/GRANT NO. |
| 12. SPONSORING AGENCY NAME AND ADDRESS<br>Office of Research and Development<br>U.S. Environmental Protection Agency<br>401 M Street, S. W.<br>Washington, DC 20460 | | 13. TYPE OF REPORT AND PERIOD COVERED<br>Final - 1974<br>14. SPONSORING AGENCY CODE |
| 15. SUPPLEMENTARY NOTES<br>Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114 | | |

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
| eutrophication<br>lakes<br>nutrients<br>phosphorus<br>nitrogen<br>loading | | 05B<br>05C |

| 18. DISTRIBUTION STATEMENT | 19. SECURITY CLASS *(This Report)* | 21. NO. OF PAGES |
|---|---|---|
| Release unlimited | | 27 |
| | 20. SECURITY CLASS *(This page)* | 22. PRICE |
| | | 4.00 |

EPA Form 2220-1 (9-73)

# REPORT
# ON
# BRUSH LAKE
# MCLEAN COUNTY
# NORTH DAKOTA
# EPA REGION VIII
# WORKING PAPER No. 567

WITH THE COOPERATION OF THE
NORTH DAKOTA STATE DEPARTMENT OF HEALTH
AND THE
NORTH DAKOTA NATIONAL GUARD
OCTOBER, 1976

CONTENTS


| | Page |
|---|---|
| Foreword | ii |
| List of North Dakota Study Lakes and Reservoirs | iv |
| Lake and Drainage Area Map | v |
| **Sections** | |
| I. Introduction | 1 |
| II. Conclusions | 1 |
| III. Lake Characteristics | 3 |
| IV. Lake Water Quality Summary | 4 |
| V. Literature Reviewed | 8 |
| VI. Appendices | 9 |

# FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

## OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

## ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

## LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Dakota State Department of Health for professional involvement, to the North Dakota National Guard for conducting the tributary sampling phase of the Survey, and to those North Dakota wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

Norman L. Peterson, Director, and the staff of the Division of Water Supply and Pollution Control of the Department of Health, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

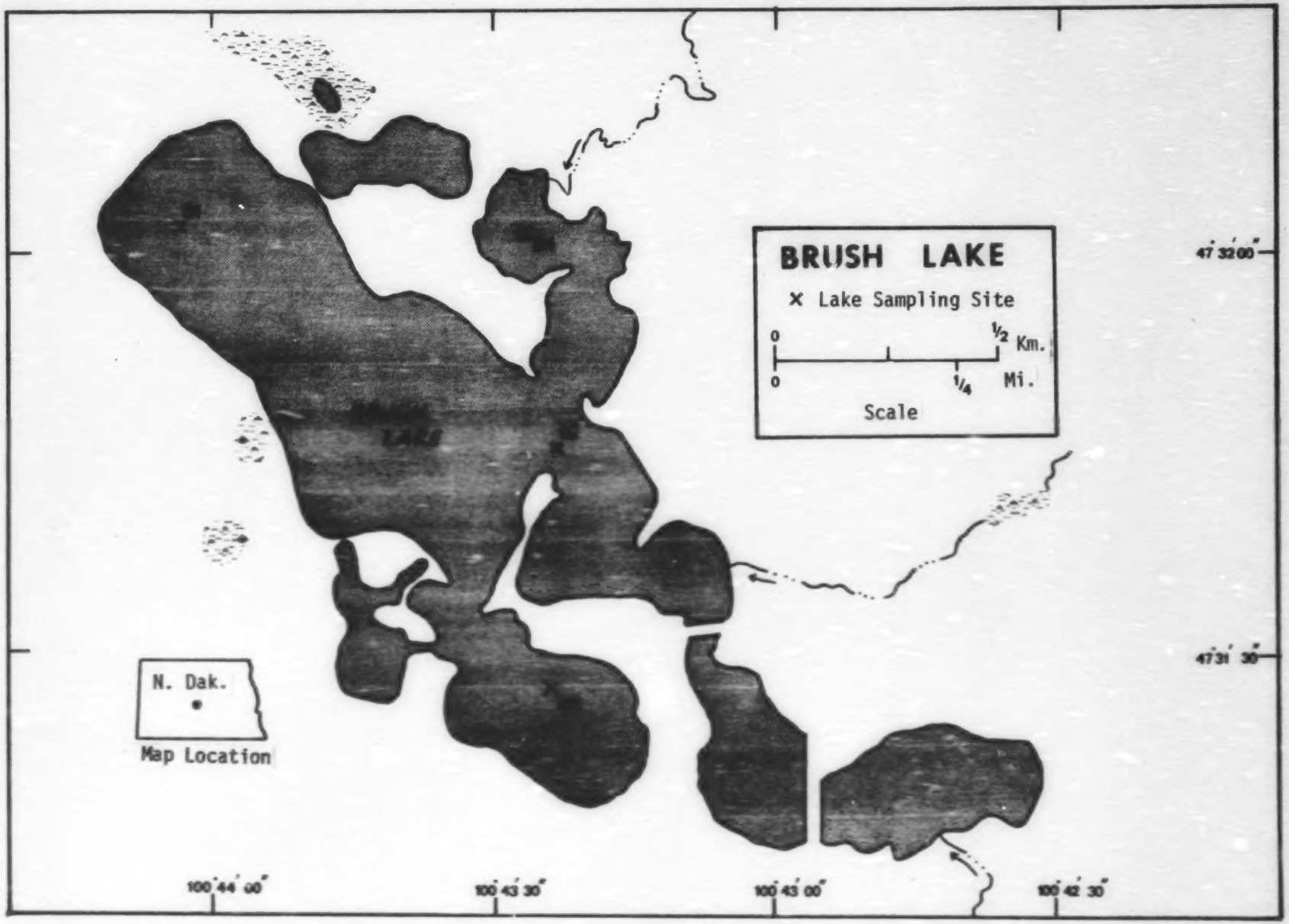
Major General LaClair A. Melhouse, the Adjutant General of North Dakota, and Project Officer Colonel Irvin M. Sande, who directed the volunteer efforts of the North Dakota National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES AND RESERVOIRS

STATE OF NORTH DAKOTA

| NAME | COUNTY |
|---|---|
| Ashtabula | Barnes, Griggs |
| Audubon | McLean |
| Brush | McLean |
| Darling | Renville, Ward |
| Devils | Benson, Ramsey |
| Jamestown | Stutsman |
| LaMoure | LaMoure |
| Matejcek | Walsh |
| Metigoshe | Bottineau |
| Pelican | Bottineau |
| Sakakawea | Dunn, McKenzie, McLean, Mercer, Mountrail, Williams |
| Spiritwood | Stutsman |
| Sweet Briar | Morton |
| Whitman | Nelson, Walsh |


BRUSH LAKE
× Lake Sampling Site
0
½ Km.
0
¼ Mi.
Scale
47°32'00"
47°31'30"
N. Dak.
Map Location
100°44'00"
100°43'30"
100°43'00"
100°42'30"

BRUSH LAKE

STORET NO. 3803

## I. INTRODUCTION

Brush Lake was included in the National Eutrophication Survey as a water body of interest to the North Dakota Department of Health. Tributaries and nutrient sources were not sampled, and this report relates only to the lake sampling data.

Brush Lake is one of North Dakota's smaller lakes; however, it has a high recreational use, and a considerable number of cabins are located along the shoreline. The lake level is maintained by runoff from surrounding agricultural areas as there are no feeder streams to Brush Lake (Peterson, 1974).

## II. CONCLUSIONS

### A. Trophic Condition:

Survey data indicate that Brush Lake is eutrophic. This lake ranked fourth in overall trophic quality when the 14 North Dakota lakes sampled in 1974 were compared using a combination of six parameters*. Three lakes had less median total phosphorus, two had less and one had the same median dissolved phosphorus, three had less median inorganic nitrogen, eight had less mean chlorophyll *a*, and eight had greater mean Secchi disc transparency.

### B. Rate-Limiting Nutrient:

The algal assay results are not considered to be representative

* See Appendix A.

of conditions in the lake at the time of sampling because of significant changes in nutrients in the sample between the time of collection and the beginning of the assay.

The lake data indicate phosphorus limitation in April and nitrogen limitation in July and September.

## III. LAKE CHARACTERISTICS†

### A. Lake Morphometry††:

1. Surface area: 0.81 kilometers$^2$.
2. Mean depth: 2.5 meters.
3. Maximum depth: 5.8 meters.
4. Volume: $2.025 \times 10^6$ m$^3$.

### B. Precipitation*:

1. Year of sampling: 53.1 centimeters.
2. Mean annual: 47.0 centimeters.

---

† Table of metric equivalents--Appendix B.
†† Henegar, 1975.
* See Working Paper No. 175, "...Survey Methods, 1973-1976".

## IV. LAKE WATER QUALITY SUMMARY

Brush Lake was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Samples for physical and chemical parameters were collected from four stations on the lake and from a number of depths at each station (see map, page v). Station 1 was sampled three times, station 2 was sampled twice, and stations 3 and 4 were sampled once. During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the April and September visits, a single 18.9-liter depth-integrated sample was composited for algal assays from stations 1 and 2. Also, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 3.0 meters at station 1, 6.1 meters at station 2, 2.1 meters at station 3, and near-surface only at station 4.

The sampling results are presented in full in Appendix C and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR BRUSH LAKE
STORET CODE 3803

| PARAMETER | 1ST SAMPLING ( 4/26/74) 2 SITES RANGE | MEAN | MEDIAN | 2ND SAMPLING ( 7/16/74) 3 SITES RANGE | MEAN | MEDIAN | 3RD SAMPLING ( 9/13/74) 2 SITES RANGE | MEAN | MEDIAN |
|---|---|---|---|---|---|---|---|---|---|
| TEMP (C) | 9.8 - 10.4 | 10.1 | 9.9 | 24.2 - 25.1 | 24.5 | 24.3 | 12.1 - 13.0 | 12.6 | 13.0 |
| DISS OXY (MG/L) | 10.0 - 10.2 | 10.1 | 10.2 | 6.0 - 7.2 | 6.6 | 6.4 | 8.4 - 9.6 | 8.8 | 8.8 |
| CNDCTVY (MCROMO) | 720. - 730. | 726. | 724. | 1212. - 1236. | 1222. | 1221. | 845. - 866. | 858. | 866. |
| PH (STAND UNITS) | 8.5 - 8.6 | 8.6 | 8.5 | 8.6 - 9.0 | 8.8 | 8.7 | 8.5 - 8.6 | 8.5 | 8.5 |
| TOT ALK (MG/L) | 338. - 425. | 398. | 400. | 295. - 415. | 354. | 366. | 505. - 670. | 574. | 525. |
| TOT P (MG/L) | 0.072 - 0.148 | 0.092 | 0.079 | 0.048 - 0.077 | 0.060 | 0.058 | 0.041 - 0.053 | 0.048 | 0.049 |
| ORTHO P (MG/L) | 0.008 - 0.011 | 0.010 | 0.010 | 0.008 - 0.018 | 0.013 | 0.011 | 0.009 - 0.013 | 0.010 | 0.009 |
| NO2+NO3 (MG/L) | 0.040 - 0.100 | 0.063 | 0.060 | 0.040 - 0.050 | 0.047 | 0.050 | 0.020 - 0.040 | 0.024 | 0.020 |
| AMMONIA (MG/L) | 0.080 - 0.100 | 0.087 | 0.090 | 0.040 - 0.060 | 0.047 | 0.045 | 0.040 - 0.050 | 0.044 | 0.040 |
| KJEL N (MG/L) | 1.500 - 2.400 | 1.786 | 1.700 | 1.600 - 2.200 | 1.800 | 1.650 | 1.800 - 2.200 | 1.980 | 2.000 |
| INORG N (MG/L) | 0.130 - 0.190 | 0.150 | 0.140 | 0.080 - 0.110 | 0.093 | 0.090 | 0.060 - 0.090 | 0.068 | 0.060 |
| TOTAL N (MG/L) | 1.560 - 2.450 | 1.849 | 1.770 | 1.640 - 2.240 | 1.847 | 1.700 | 1.820 - 2.240 | 2.004 | 2.020 |
| CHLRPYL A (UG/L) | 5.8 - 5.8 | 5.8 | 5.8 | 32.9 - 62.6 | 48.7 | 50.6 | 21.6 - 24.5 | 23.0 | 23.0 |
| SECCHI (METERS) | 1.8 - 1.9 | 1.9 | 1.9 | 1.1 - 1.2 | 1.2 | 1.1 | 0.9 - 0.9 | 0.9 | 0.9 |

B. Biological characteristics:

1. Phytoplankton -

| Sampling Date | Dominant Genera | Algal Units per ml |
|---|---|---|
| 04/26/74 | 1. Cryptomonas sp. | 711 |
| | 2. Chroomonas sp. | 561 |
| | 3. Elakatothrix sp. | 75 |
| | 4. Asterionella sp. | 75 |
| | 5. Synura sp. | 37 |
| | Total | 1,459 |
| 07/16/74 | 1. Melosira sp. | 6,944 |
| | 2. Fragilaria sp. | 807 |
| | 3. Anabaena sp. | 431 |
| | 4. Chroomonas sp. | 323 |
| | 5. Schroederia sp. | 269 |
| | Other genera | 377 |
| | Total | 9,151 |
| 09/13/74 | 1. Microcystis sp. | 3,680 |
| | 2. Fragilaria sp. | 1,968 |
| | 3. Oocystis sp. | 548 |
| | 4. Chroomonas sp. | 255 |
| | 5. Cryptomonas sp. | 218 |
| | Other genera | 546 |
| | Total | 7,215 |

2. Chlorophyll a -

| Sampling Date | Station Number | Chlorophyll a (µg/l) |
|---|---|---|
| 04/26/74 | 1 | 5.8 |
| | 2 | 5.8 |
| | 3 | - |
| | 4 | - |
| 07/16/74 | 1 | 62.6 |
| | 2 | - |
| | 3 | 50.6 |
| | 4 | 32.9 |
| 09/13/74 | 1 | 24.5 |
| | 2 | 21.6 |
| | 3 | - |
| | 4 | - |

C. Limiting Nutrient Study:

The algal assay results are not considered to be representative of conditions in the lake at the time of sampling because of significant changes in nutrient levels in the sample between the time of collection and the beginning of the assay.

The lake data indicate phosphorus limitation in April (the mean inorganic nitrogen/orthophosphorus ratio was 15/1) but nitrogen limitation in July and September (the mean N/P ratio was 7/1 both times).

## V. LITERATURE REVIEWED

Henegar, Dale, 1975. Personal communication (lake morphometry). ND Game & Fish Dept., Bismarck.

Peterson, Norman L., 1974. Personal communication (general lake information). ND Dept. of Health, Bismarck.

# VI. APPENDICES

## APPENDIX A

## LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

| LAKE CODE | LAKE NAME | MEDIAN TOTAL P | MEDIAN INORG N | 500-MEAN SEC | MEAN CHLORA | 15-MIN DO | MEDIAN DISS ORTHO P |
|---|---|---|---|---|---|---|---|
| 3801 | LAKE ASHTABULA | 0.260 | 0.160 | 472.250 | 40.892 | 10.600 | 0.170 |
| 3802 | LAKE AUDUBON | 0.087 | 0.220 | 446.222 | 11.322 | 11.000 | 0.015 |
| 3803 | BRUSH LAKE | 0.066 | 0.095 | 449.143 | 29.114 | 9.000 | 0.010 |
| 3804 | LAKE DARLING | 0.274 | 0.250 | 466.750 | 60.075 | 11.600 | 0.180 |
| 3805 | DEVILS LAKE | 0.630 | 0.140 | 449.333 | 38.508 | 14.600 | 0.469 |
| 3806 | JAMESTOWN RESERVOIR | 0.144 | 0.365 | 438.667 | 19.400 | 8.800 | 0.078 |
| 3807 | LAKE LA MOURE | 0.438 | 0.380 | 421.400 | 19.720 | 15.000 | 0.290 |
| 3808 | MATEJCEK LAKE | 0.228 | 0.440 | 475.167 | 2.683 | 14.400 | 0.179 |
| 3809 | LAKE METIGOSHE | 0.032 | 0.080 | 389.167 | 10.367 | 9.000 | 0.010 |
| 3811 | PELICAN LAKE | 0.034 | 0.070 | 364.500 | 10.950 | 12.800 | 0.006 |
| 3812 | LAKE SAKAKAWEA (GARRISON | 0.016 | 0.150 | 408.733 | 6.883 | 10.800 | 0.007 |
| 3813 | SPIRIT WOOD LAKE | 0.156 | 0.290 | 417.833 | 34.667 | 15.000 | 0.082 |
| 3814 | SWEET BRIAR RESERVOIR | 0.092 | 0.090 | 440.800 | 39.000 | 8.800 | 0.031 |
| 3815 | WHITMAN LAKE | 0.260 | 0.260 | 478.333 | 27.067 | 9.200 | 0.185 |

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

| LAKE CODE | LAKE NAME | MEDIAN TOTAL P | MEDIAN INORG N | 500-MEAN SEC | MEAN CHLORA | 15-MIN DO | MEDIAN DISS ORTHO P | INDEX NO |
|---|---|---|---|---|---|---|---|---|
| 3801 | LAKE ASHTABULA | 27 ( 3) | 54 ( 7) | 15 ( 2) | 8 ( 1) | 62 ( 8) | 38 ( 5) | 204 |
| 3802 | LAKE AUDUBON | 69 ( 9) | 46 ( 6) | 46 ( 6) | 69 ( 9) | 46 ( 6) | 69 ( 9) | 345 |
| 3803 | BRUSH LAKE | 77 ( 10) | 77 ( 10) | 38 ( 5) | 38 ( 5) | 81 ( 10) | 81 ( 10) | 392 |
| 3804 | LAKE DARLING | 15 ( 2) | 38 ( 5) | 23 ( 3) | 0 ( 0) | 38 ( 5) | 23 ( 3) | 137 |
| 3805 | DEVILS LAKE | 0 ( 0) | 69 ( 9) | 31 ( 4) | 23 ( 3) | 15 ( 2) | 0 ( 0) | 138 |
| 3806 | JAMESTOWN RESERVOIR | 54 ( 7) | 15 ( 2) | 62 ( 8) | 62 ( 8) | 96 ( 12) | 54 ( 7) | 343 |
| 3807 | LAKE LA MOURE | 8 ( 1) | 8 ( 1) | 69 ( 9) | 54 ( 7) | 4 ( 0) | 8 ( 1) | 151 |
| 3808 | MATEJCEK LAKE | 38 ( 5) | 0 ( 0) | 8 ( 1) | 100 ( 13) | 23 ( 3) | 31 ( 4) | 200 |
| 3809 | LAKE METIGOSHE | 92 ( 12) | 92 ( 12) | 92 ( 12) | 85 ( 11) | 81 ( 10) | 81 ( 10) | 523 |
| 3811 | PELICAN LAKE | 85 ( 11) | 100 ( 13) | 100 ( 13) | 77 ( 10) | 31 ( 4) | 100 ( 13) | 493 |
| 3812 | LAKE SAKAKAWEA (GARRISON | 100 ( 13) | 62 ( 8) | 85 ( 11) | 92 ( 12) | 54 ( 7) | 92 ( 12) | 485 |
| 3813 | SPIRIT WOOD LAKE | 46 ( 6) | 23 ( 3) | 77 ( 10) | 31 ( 4) | 4 ( 0) | 46 ( 6) | 227 |
| 3814 | SWEET BRIAR RESERVOIR | 62 ( 8) | 85 ( 11) | 54 ( 7) | 15 ( 2) | 96 ( 12) | 62 ( 8) | 374 |
| 3815 | WHITMAN LAKE | 27 ( 3) | 31 ( 4) | 0 ( 0) | 46 ( 6) | 69 ( 9) | 15 ( 2) | 188 |

LAKES RANKED BY INDEX NOS.

| RANK | LAKE CODE | LAKE NAME | INDEX NO |
|---|---|---|---|
| 1 | 3809 | LAKE METIGOSHE | 523 |
| 2 | 3811 | PELICAN LAKE | 493 |
| 3 | 3812 | LAKE SAKAKAWEA (GARRISON | 485 |
| 4 | 3803 | BRUSH LAKE | 392 |
| 5 | 3814 | SWEET BRIAR RESERVOIR | 374 |
| 6 | 3802 | LAKE AUDUBON | 345 |
| 7 | 3806 | JAMESTOWN RESERVOIR | 343 |
| 8 | 3813 | SPIRIT WOOD LAKE | 227 |
| 9 | 3801 | LAKE ASHTABULA | 204 |
| 10 | 3808 | MATEJCEK LAKE | 200 |
| 11 | 3815 | WHITMAN LAKE | 188 |
| 12 | 3807 | LAKE LA MOURE | 151 |
| 13 | 3805 | DEVILS LAKE | 138 |
| 14 | 3804 | LAKE DARLING | 137 |

# APPENDIX B

## CONVERSION FACTORS

## CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x $8.107 \times 10^{-4}$ = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

# APPENDIX C

## PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/11/07

3=0301
47 33 25.0 100 42 45.0
BRUSH LAKE
38055 NORTH DAKOTA

11EPALES
4

2111202
0015 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00610 NH3-N TOTAL MG/L | 00625 TOT KJEL N MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74/04/26 | 14 40 | 0000 | 10.4 | | 72 | 730 | 8.55 | 388 | 0.090 | 1.700 | 0.100 | 0.008 |
| | 14 40 | 0005 | 10.4 | 10.2 | | 730 | 8.55 | 400 | 0.080 | 1.600 | 0.060 | 0.011 |
| | 14 40 | 0010 | 10.4 | 10.0 | | 730 | 8.55 | 398 | 0.080 | 1.900 | 0.060 | 0.010 |
| 74/07/16 | 14 40 | 0000 | 24.4 | 7.2 | 46 | 1228 | 9.00 | 300 | 0.040 | 2.200 | 0.040 | 0.011 |
| | 14 40 | 0005 | 24.3 | 6.4 | | 1221 | 8.70 | 295 | 0.050 | 1.600 | 0.040 | 0.012 |
| | 14 40 | 0009 | 24.2 | 6.4 | | 1221 | 8.70 | 382 | 0.050 | 2.100 | 0.050 | 0.017 |
| 74/09/13 | 14 00 | 0000 | 13.0 | 8.6 | 36 | 866 | 8.49 | 525 | 0.040 | 2.000 | 0.020K | 0.009 |
| | 14 00 | 0005 | 13.0 | 8.4 | | 866 | 8.48 | 655 | 0.040 | 1.800 | 0.020K | 0.009 |
| | 14 00 | 0009 | 13.0 | 8.8 | | 866 | 8.48 | 670 | 0.040 | 2.000 | 0.020K | 0.009 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00665 PHOS-TOT MG/L P | 32217 CHLRPHYL A UG/L | 00031 INCDT LT REMNING PERCENT |
|---|---|---|---|---|---|
| 74/04/26 | 14 40 | 0000 | 0.072 | 5.8 | |
| | 14 40 | 0005 | 0.079 | | |
| | 14 40 | 0010 | 0.119 | | |
| 74/07/16 | 14 40 | 0000 | 0.069 | 62.6 | |
| | 14 40 | 0005 | 0.077 | | 1.0 |
| | 14 40 | 0009 | 0.063 | | |
| 74/09/13 | 14 00 | 0000 | 0.041 | 24.5 | |
| | 14 00 | 0005 | 0.049 | | 1.0 |
| | 14 00 | 0009 | 0.053 | | |

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/11/07

380302
47 33 10.0 100 42 30.0
BRUSH LAKE
38055 NORTH DAKOTA

11EPALES
4

2111202
0024 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00610 NH3-N TOTAL MG/L | 00625 TOT KJEL N MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74/04/26 | 15 00 | 0000 | 9.9 | | 76 | 724 | 8.55 | 420 | 0.100 | 1.700 | 0.070 | 0.010 |
| | 15 00 | 0005 | 9.9 | 10.0 | | 723 | 8.55 | 420 | 0.090 | 1.500 | 0.060 | 0.009 |
| | 15 00 | 0015 | 9.9 | 10.2 | | 722 | 8.55 | 425 | 0.090 | 1.700 | 0.040 | 0.009 |
| | 15 00 | 0020 | 9.8 | 10.2 | | 720 | 8.56 | 338 | 0.080 | 2.400 | 0.050 | 0.011 |
| 74/09/13 | 13 25 | 0000 | 12.1 | 8.8 | 36 | 845 | 8.65 | 505 | 0.050 | 2.200 | 0.040 | 0.013 |
| | 13 25 | 0005 | 12.1 | 9.6 | | 845 | 8.59 | 515 | 0.050 | 1.900 | 0.020K | 0.012 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00665 PHOS-TOT MG/L P | 32217 CHLRPHYL A UG/L | 00031 INCDT LT REMNING PERCENT |
|---|---|---|---|---|---|
| 74/04/26 | 15 00 | 0000 | 0.080 | 5.8 | |
| | 15 00 | 0005 | 0.074 | | |
| | 15 00 | 0015 | 0.075 | | |
| | 15 00 | 0020 | 0.148 | | |
| 74/09/13 | 13 25 | 0000 | 0.047 | 21.6 | |
| | 13 25 | 0005 | 0.052 | | |
| | 13 25 | 0009 | | | 1.0 |

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/11/07

380303
47 31 48.0 100 13 30.0
BRUSH LAKE
38055 NORTH DAKOTA

11EPALES
4

2111202
0009 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00610 NH3-N TOTAL MG/L | 00625 TOT KJEL N MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74/07/16 | 15 00 | 0000 | 25.1 | 6.4 | 45 | 1216 | 8.80 | 378 | 0.040 | 1.700 | 0.050 | 0.008 |
| | 15 00 | 0005 | 24.2 | 6.0 | | 1212 | 8.80 | 354 | 0.040 | 1.600 | 0.050 | 0.010 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00665 PHOS-TOT MG/L P | 32217 CHLRPHYL A UG/L | 00031 INCDT LT REMNING PERCENT |
|---|---|---|---|---|---|
| 74/07/16 | 15 00 | 0000 | 0.048 | 50.6 | |
| | 15 00 | 0002 | | | 50.0 |
| | 15 00 | 0005 | 0.051 | | |
| | 15 00 | 0007 | | | 1.0 |

STORET RETRIEVAL DATE 75/11/07

380304
47 31 52.0 100 13 35.0
BRUSH LAKE
38055 NORTH DAKOTA

11EPALES
4

2111202
0005 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00610 NH3-N TOTAL MG/L | 00625 TOT KJEL N MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74/07/16 | 15 | 10 0000 | 24.5 | 7.0 | 45 | 1236 | 8.60 | 415 | 0.060 | 1.600 | 0.050 | 0.018 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00665 PHOS-TOT MG/L P | 32217 CHLRPHYL A UG/L | 00031 INCDT LT REMNING PERCENT |
|---|---|---|---|---|---|
| 74/07/16 | 15 | 10 0000 | 0.053 | 32.9 | |

61